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ANCHOR QEA

Briefing Paper

August 16, 2017

Terminal 4 Overview

The Port of Portland (Port) is providing this series of briefing papers to support discussions between the Port and the U.S. Environmental Protection Agency (USEPA) about Terminal 4 (T4). This first briefing paper provides a high-level discussion of the factual and historical background to T4 (T4 Overview) that supports the discussion in subsequent briefing papers. Those address key issues and assumptions that will drive the Remedial Design and Remedial Action process at T4 on the following topics:

1. Source Control;
2. Use of In-place Remedial Technologies;
3. Delineation of Benthic Risk Areas; and
4. Human Health Direct Contact Risk.

Terminal 4 Overview

The Port manages T4 on the east bank of the Willamette River between river miles (RM) 4.2 and 5.0 (also known as Sediment Decision Unit RM 4.5E within the Portland Harbor Superfund Site [Portland Harbor]).

T4 is comprised of Slip 1, Wheeler Bay, and Slip 3 (Figure 1), which are summarized as follows:

- Slip 1 is inactive with no existing water-dependent use but may be developed in the future for shallow-draft barge use.
- Wheeler Bay is an inactive bay with no existing water-dependent use and none anticipated in the future.
- Slip 3 contains Berths 410 and 411, which are the main site of active marine operations (80% occupancy) serving deep-draft ocean-going vessels. Berths 410 and 411 are along the north side of Slip 3. The south side of Slip 3 is inactive.

At T4, the USEPA identified the following contaminants of concern: polycyclic aromatic hydrocarbons (PAHs), including carcinogenic PAHs (cPAHs), and polychlorinated biphenyls (PCBs).

Portland Harbor Remediation Approach

The overall remediation approach for Portland Harbor is described in the Portland Harbor Record of Decision (ROD), Section 14.2.9, Design Requirements, and Figure 28, Technology Application Decision Tree.

Active remediation areas within Portland Harbor were identified as areas with sediment concentrations greater than remedial action levels (RALs), which are ultimately intended to achieve ROD cleanup levels (ROD Table 17) over the long-term. The remediation areas associated with PAH contamination at T4 are largely attributed to human health direct contact risk and ecological risk to benthic organisms. Remediation areas associated with PCB contamination are associated with human health fish consumption risk.

Terminal 4 is Unique

Many site-specific factors at T4 make it unique within the context of Portland Harbor. These factors warrant special consideration during remedial design. They include the following:

- The Port has completed several sediment remedial actions over the last few decades at T4. These actions were taken to reduce site risk associated with contaminated sediments. From the 1990s through the 2000s, more than 50,000 cubic yards of contaminated sediment have been removed from T4. The majority of the sediment remediation occurred under two actions. First in 1995, the Port removed 35,000 cubic yards under a Consent Decree with the United States (Port of Portland et al. 1993; Port of Portland 1995a, 1995b). Second in 2008, the Port removed approximately 12,819 cubic yards of contaminated sediment and installed a cap under an Administrative Order on Consent with USEPA (USEPA 2003, 2006).
- T4 Slips 1 and 3 were constructed to serve deep-draft ocean-going vessels. As such, Slips 1 and 3 possess the same physical features as the federal navigational channel to allow the deep-draft vessels to berth in the slips. The water depth for both slips is greater than -30 feet Columbia River Datum (CRD), with Slip 3 being maintained at - 40 feet CRD. Both of these slips have over-steepened slopes caused by the deepening of the slips to accommodate navigation needs. At Slip 3, Berths 410 and 411, the maintenance dredge prism extends into the federal navigation channel. The prevailing navigational use and deep water at T4 (-30 to -40 feet CRD in Slip 1 and Slip 3) are more analogous to the conditions in the federal navigation channel than other "intermediate" zones in Portland Harbor.
- Side slopes at Slips 1 and 3 are steep and riprapped, with no public beaches, negligible shallow water habitat, and low habitat value.
- Removal actions on or adjacent to the steep terminal side slopes could pose a risk of undermining the stability of the terminal slopes, waterfront structures, and remediation elements previously installed during the 2008 Early Action (i.e., the slope stabilization measures in Wheeler Bay and the reactive cap at the head of Slip 3).
- Site access at T4, from both the uplands and the water, is heavily controlled by the Port's duties under the Marine Transportation Security Act and the Port's Facility Security Plan (33 Code of Federal Regulations [CFR] Part 105), which all but eliminate public access to the terminal.

- Historically, PAH contamination at T4 was derived from two principal sources: former offloading of pencil pitch (a solid hydrocarbon product used in the aluminum industry) and fuel seepage from a former pipeline connecting the dock to a former tank farm on the uplands. The presence of pencil pitch is a unique form of PAH contamination that has been shown to have reduced bioavailability and toxicity compared to other more common forms of PAHs found harbor-wide.
- At T4, there is no nonaqueous phase liquid (NAPL) or "not reliably contained" principle threat waste (PTW). There is one small area of "highly toxic" PTW based on one isolated sample with a PCB concentration (1,000 micrograms per kilogram [µg/kg]) exceeding the PTW threshold of 200 µg/kg. In "highly toxic" PTW areas, a reactive cap or dredging with a reactive residual cover may be required.

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Figure

ANCHOR QEA

Figure 1
Terminal 4 Overview
Portland Harbor Superfund Site

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Briefing Paper

August 16, 2017

Source Control at Terminal 4

The Port of Portland (Port) has worked with the Department of Environmental Quality (DEQ) on upland investigation and remediation at Terminal 4 (T4) for more than 20 years, including within DEQ's Voluntary Cleanup Program (VCP). On June 27, 2002, the Port entered into a VCP Agreement with DEQ for a Feasibility Study (FS) and Source Control Measures on the Slip 3 parcel of T4 (LQVCNWR-02-11), and on October 7, 2004, a Consent Judgment between the DEQ and Port was filed in the Circuit Court of Oregon for Multnomah County (No. 0410-10234) to execute the remedy elements of DEQ's Record of Decision (ROD) for this parcel (DEQ 2003). On December 4, 2003, the Port entered into a VCP Agreement with DEQ for Remedial Investigation (RI), Source Control Measures, and an FS on the Slip 1 parcel of T4 (DEQ No. LQVC-NWR-03-18).

For Slips 1 and 3, the RI and FS phases have been completed, including source control evaluations (Ash Creek/Newfields 2007; Ash Creek 2011; Hart Crowser 2000, 2002). The Port implemented several remedial actions, including source control associated with RI/FS findings and the Consent Judgment for T4 Slip 3, which are presented in detail in the following sections. The primary source control pathways of concern at T4 are groundwater, stormwater, and bank erosion; those sources are currently controlled or are scheduled to be controlled prior to or concurrent with sediment cleanup actions.

Groundwater Controls

Portland Harbor, Remedial Action Objectives (RAOs) 4 and 8 are intended to reduce groundwater discharges to surface water and sediment to acceptable levels. T4 groundwater discharges are controlled through coordinated upland and in-water actions. Extensive work was completed to control diesel and oil contamination associated with a pipeline connecting a fuel tank, located east of the Slip 3 property, to a historical fuel dock on the river. DEQ concluded, "the groundwater remedy appears to be successful, and the sediment recontamination potential due to groundwater at the site is low" (DEQ 2016).

The U.S. Environmental Protection Agency's (USEPA's) description of an active groundwater plume discharging to the head of Slip 3 (see ROD [DEQ 2003], Figure 6) appears to be at odds with the current status of source control activities. This plume has been controlled as a result of the following groundwater source control actions (DEQ 2010, 2016):

- **1993.** An "interim" groundwater and nonaqueous phase liquid extraction system was installed at the head of Slip 3 and is still in operation.

- **1998.** The abandoned fuel pipeline on the southern peninsula of Slip 3 was drained and removed.
- **2004.** Contaminated riverbank soil at the head of Slip 3 was excavated, and a reactive cap amended with organoclay was placed over the excavated soil surface to control diesel seepage associated with the former pipeline, as part of the Bank Excavation and Backfill Remedial Action (BEBRA) project (BBL et al. 2005).
- **2008.** As part of the T4 Early Action, the reactive cap at the head of Slip 3 was extended farther into the water.
- **2008 to present.** The Early Action cap continues to be routinely monitored (Anchor QEA 2016), and no sheen has been observed at the head of Slip 3 since reactive caps were installed on the uplands and in the water.

Stormwater Controls

The Port has implemented various stormwater source control measures at T4, including pipeline cleaning of high-risk drainage basins, street sweeping, impervious surface removal, and installation of treatment cartridges containing zeolite, perlite, and activated carbon in an existing StormFilter vault (Ash Creek 2011; Apex 2013; Geosyntec 2015). The Port also conducted a stormwater recontamination analysis to provide another line of evidence to the results and information from completing the source control measures (Formation 2012).

The Port is planning to further implement stormwater infrastructure improvements to treat runoff from several stormwater drainage basins that discharge to Slips 1 and 3. These improvements are expected to be completed by 2019. As a result, "DEQ considers the stormwater pathway at the site controlled, pending effectiveness demonstration, and the sediment recontamination potential is low" (DEQ 2016).

Bank Erosion Controls

RAO 9 is intended to reduce the migration of contaminants in river bank soils, primarily via erosion to the river, to acceptable levels. USEPA did not identify any contaminated riverbanks at T4 in its ROD (see ROD Figure 9). However, DEQ determined, "There are two additional areas of potentially erodible soil containing PAHs along the south bank of Slip 3 and the east bank of the Willamette River south of Slip 3. Due to considerations of cost and efficiency, the Port proposes to address these areas at the time of USEPA's in-water remedy" (DEQ 2016). Therefore, the Port plans to further evaluate these two small areas of bank contamination during its pre-remedial design investigation. The following bank erosion source actions have been completed to date:

- **2008.** As part of the T4 Early Action, the bank of Wheeler Bay was stabilized to prevent the erosion of contaminated materials into the bay (Anchor 2009; Ash Creek 2009).

- **2009.** Upland soil hot spot removal and bank stabilization actions were completed (Ash Creek 2010).

Completed Sediment Remediation and Removal Actions

The Port has implemented a number of sediment remediation and removal actions over the last few decades, primarily in Slip 3, to reduce ongoing site risk from contaminated sediments. The Port also conducted navigational dredging projects that simultaneously resulted in the removal of contaminated sediments. The chronology of sediment remediation and removal actions at T4 includes the following:

- **1984.** The Port dredged approximately 5,000 cubic yards (cy) of material that had accumulated in the pencil pitch unloading berths (Port of Portland 1992).
- **1993 to 1995.** In 1993, the Port entered into a Consent Decree with the United States (Port of Portland et al. 1993), and in 1995, the Port removed 35,000 cy of contaminated sediment from Slip 3 (Port of Portland 1995a, 1995b).
- **1997.** The Port removed 5,400 cy of sediment from around the pencil pitch unloading berths as part of a maintenance dredging action (Port of Portland 1998a, 1998b).
- **1998.** Hall-Buck (now Kinder Morgan) undertook dredging in Slip 3 to remove pencil pitch spilled on June 18, 1997. In this year, pencil pitch loading at T4 was discontinued (Hartman Consulting Corporation 1998).
- **2002 to 2005.** The Port removed approximately 4,750 cy of contaminated sediment from Berths 410 and 411 during maintenance dredging projects. In addition, around 2,000 cy of contaminated sediment below the ordinary high water mark were removed as part of the BEBRA project (BBL et al. 2005).
- **2008 Early Action.** The T4 Early Action was performed under an Administrative Order on Consent with USEPA (USEPA 2003, 2006). Approximately 12,819 cy of contaminated sediment were removed from Slip 3; a reactive cap, sand cap, and sand cover were placed at the head of the slip; and the Wheeler Bay shoreline was stabilized by flattening the slope, armoring, and planting to eliminate sloughing and erosion. Because the RAOs and cleanup levels for Portland Harbor had not yet been established, these actions were completed as part of an initial abatement measure (Phase I), and any follow-up actions that might be needed (Phase II) were deferred until after the issuance of the ROD. The contaminant reductions effected by the Early Action Phase I work are shown in Figure 1, which compares the sediment quality conditions in Slip 3 before and after Early Action construction.
- **2013.** The Port removed approximately 5,500 cy of material during maintenance dredging actions at Berth 410 (Hart Crowser 2012; PSET 2012). The outer two-thirds of the dredge prism at Berth 410 was deemed suitable for open-water disposal. The inner third of the dredge prism exceeded screening levels of the Sediment Evaluation Framework, the regional

dredging guidance for the Pacific Northwest (USACE et al. 2009). As a result, a sand cover was placed over this part of the berth.

Conclusion

The applicable upland sources are currently controlled or are in the process of being controlled prior to or concurrent with sediment cleanup actions.

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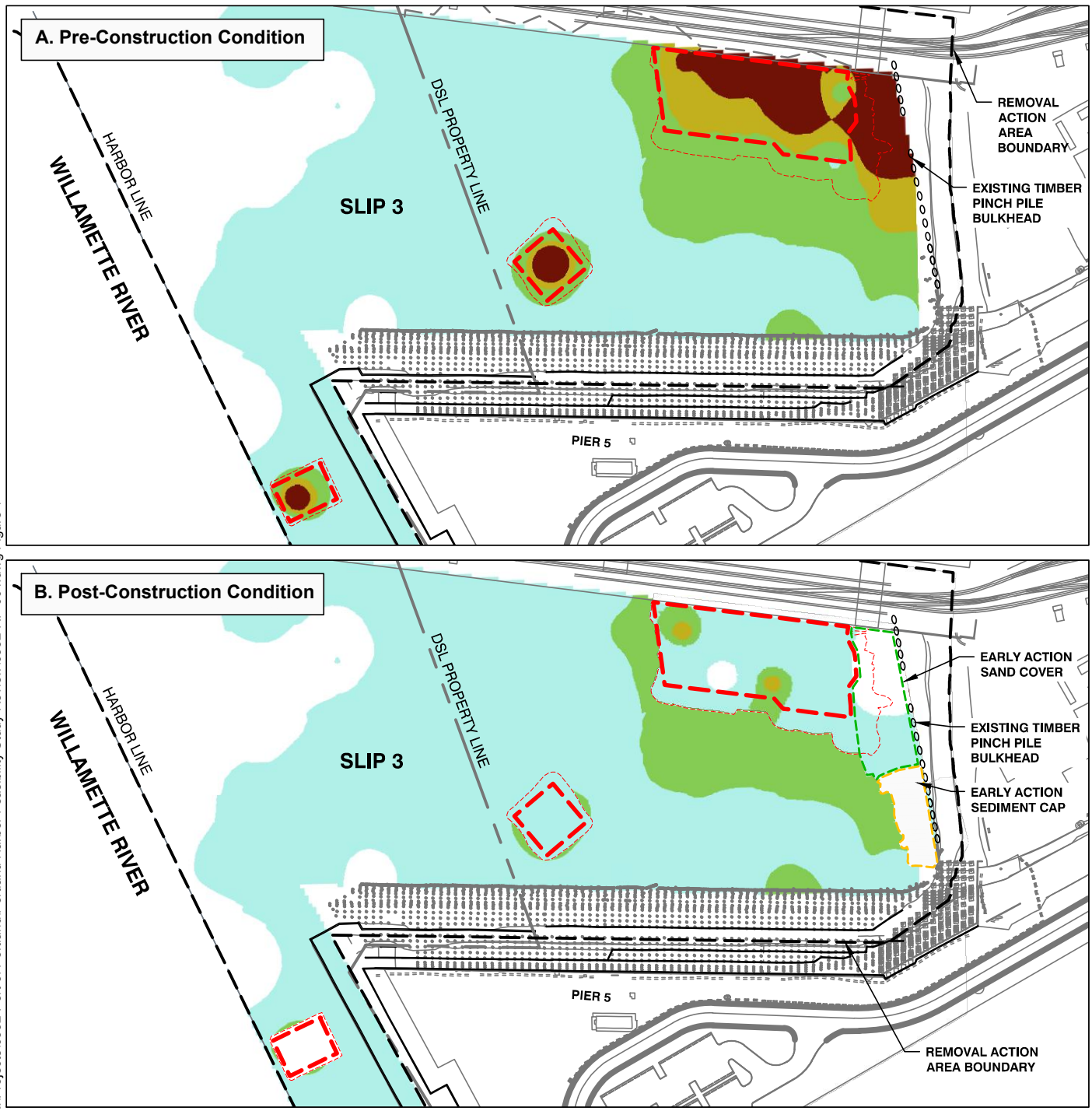
Figure



K:\Projects\0332-Port of Portland\Portland Harbor Feasibility Study Review\0332-RP-001.dwg Figure 1

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HORIZONTAL DATUM: Port of Portland Local Projection, International Feet.
VERTICAL DATUM: NGVD29-47.

SURFACE PEC EXCEEDANCE RATIO:

- <1
- 1-10
- 10.1-20
- 20.1-30
- >30

EARLY ACTION COMPONENTS (PHASE I):

- PHASE I DREDGE BOUNDARY
- PHASE I DAYLIGHT BOUNDARY
- SAND COVER
- SEDIMENT CAP

0 200
Scale in Feet

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Figure 1
Terminal 4 Early Action Contaminant Reduction
Portland Harbor Superfund Site

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Use of In-place Remedial Technologies at Terminal 4

The Port of Portland (Port) is evaluating how changes in use may affect current and future navigation and maintenance dredging requirements for Slips 1 and 3. For instance, while Slip 3 remains the Port's most active slip in Portland Harbor, Slip 1 is currently not being used at all, and in the future, it will only be used as a shallow-draft barge (if at all). In addition, it is infeasible to dredge in many parts of Terminal 4 (T4) due to bank stability concerns. As such, current and future land uses and navigation requirements may provide opportunities for cost-effective use of in situ remedial technologies.

ROD Assumptions

T4 contains "future maintenance dredging areas" (FMD areas), "intermediate" areas with no current and limited or no-future navigation requirements, and very limited "shallow" areas (above -2 feet Columbia River Datum), primarily in Wheeler Bay.

In potential FMD areas, the Record of Decision (ROD) requires dredging or capping with the top elevation of engineered caps to be placed below the navigation depth plus an appropriate buffer to protect the cap from future maintenance dredging actions. The ROD assumed that all of Slips 1 and 3 were "potential future maintenance dredge areas."

Outside of potential FMD areas in intermediate water depths, the use of dredging or capping is dependent on site-specific design analysis, in consideration of structures, debris, slopes, marine terminal operations, and other factors (ROD Section 14.2.9.1), all of which are important considerations at T4. Similar technology application criteria apply to shallow areas, but in addition, the pre-construction mudline elevation must be reestablished using clean backfill material, if necessary. A habitat layer, such as beach mix, is to be used for the final clean cover layer.

Site-specific Considerations

Dredging Risks. Dredging is not feasible in many parts of T4 because of the risk of undermining steep riprapped terminal slopes, terminal structures, and engineered caps and stabilized shorelines that were previously placed during the 2008 T4 Early Action.

Future Navigation Needs. The Port is evaluating how changes in use may affect current and future navigation and maintenance dredging requirements for Slips 1 and 3. For example, Section 14.2 of the ROD specifically allows for "eliminating the need for a more expensive dredge and armored cap remedy if a significant area will no longer to be used for marine terminal purposes."

Sediment Stability. In situ remedial technologies require an evaluation of sediment stability. Several lines of evidence show that sediment conditions throughout much of T4 are stable and reliably contained within the terminal area (see Appendix A-1 of the Port's comments on the U.S. Environmental Protection Agency's [USEPA's] Proposed Plan). For example, the off-channel waterways at T4 are generally characterized by quiescent depositional conditions, evidenced by net sediment accretion in bathymetric surveys, low velocities in current meters, and prevailing fine-grained sediment textures. Various potential sediment disturbance mechanisms, including extreme flood events, wind and vessel waves, earthquakes, and construction activities, have been shown to have limited potential for remobilizing sediments at T4. In limited areas, such as the active berthing lanes in Slip 3 (Berths 410 and 411) and the more exposed portions of the Wheeler Bay shoreline, additional stability can be engineered to withstand local erosive forces from waves or vessel propwash.

Proposed Path Forward

The Port proposes to evaluate with USEPA how to create a Remedial Design/Remedial Action process that will account for current and future conditions at T4 and allow for a balanced application of remedial technologies that effectively address site risks, while accommodating site-specific navigation requirements, structural constraints, and slope stability concerns.

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Delineation of Benthic Risk Areas at Terminal 4

Remedial Action Objective (RAO) 5 is intended to reduce risk to benthic organisms from direct contact and ingestion of contaminated sediment to acceptable exposure levels. The Port of Portland (Port) recognizes there may be risks to benthic organisms at Terminal 4 (T4), which may be a primary consideration during remedial design. It is important to the Port that those areas be identified and targeted for cleanup.

ROD Assumptions

The U.S. Environmental Protection Agency (USEPA) evaluated benthic risk using the area defined by an order of magnitude greater than the RAO 5 preliminary remediation goal (PRG). The Record of Decision (ROD) states that during Remedial Design, toxicity testing may be used to refine the delineation of benthic risk areas in areas that are not driven by risk via another more stringent RAO.

Once benthic risk areas are defined, the post-construction interim target for RAO 5 is a 50% reduction in the area posing unacceptable benthic risk.[1] In other words, the entire area above the RAO 5 PRG does not need to be addressed through capping and dredging if 50% of the area is addressed through active remediation, and the other 50% of the area is addressed through monitored natural recovery.

The areas exceeding RAO 5, 10x RAO 5, and 100x RAO 5 PRGs are presented in Figure 4.2-25a of Appendix IV of the ROD, along with the active remediation areas for USEPA's selected remedy. At T4, the benthic risk area exceeding the ROD's 10x RAO 5 PRG encompasses the outer two-thirds of Slip 3 and a small portion of Wheeler Bay, as shown in Figure 1.

Site-specific Considerations

As discussed above, the benthic risk area is based on a numeric screening of chemical concentrations exceeding 10x RAO 5 PRGs. At T4, however, site specific information based on earlier studies appears to identify different benthic risk areas than those identified using the ROD approach. These earlier studies were supported by site-specific bioassays (Hart Crowser 2000) and multiple lines of evidence for benthic toxicity (comprehensive benthic risk areas; Windward 2014). Both of these studies showed that the most significant benthic toxicity is concentrated in the head (approximately the inner half) of Slip 3. This makes sense given what is known about the current distribution of PAH

[1] Appendix A of EPA's Responsiveness Summary to the ROD (Page I-7) states, "The protection of benthic species to contaminated sediment is evaluated using the benthic risk area defined by an order of magnitude greater than the RAO 5 PRGs. The postconstruction interim target for RAO 5 was established at 50 percent reduction in the area posing unacceptable benthic risk."

concentrations in T4 surface sediments (with higher concentrations near the head of the slip) and the known locations of historical sources such as pencil pitch unloading areas and fuel pipeline leaks, all of which are concentrated in the head of Slip 3.

In contrast, the ROD shows the highest benthic toxicity in the outer portion of Slip 3, where site-specific bioassay tests previously showed no toxicity, resulting in a "false positive". In addition, USEPA's benthic risk area excludes some of the highest PAH concentrations in the head of the slip, resulting in a "false negative" error.

The ROD appears to characterize T4 in a way that may be inconsistent with existing site chemical and biological data obtained during the T4 Remedial Investigation, Engineering Evaluation/Cost Analysis, Early Action investigations, as well as the Portland Harbor Baseline Ecological Risk Assessment (LWG 2012, 2013). For example, USEPA concludes that chlordane (Feasibility Study Figure D11-1b) and lindane (Feasibility Study Figure D11-1j) are substantial contributors to benthic risk at T4; however, no lindane detections have been observed at T4, and no chlordane detection exceeds the ROD Cleanup Level (ROD Table 17). These are some of the inconsistencies that will need to be addressed in Remedial Design.

Proposed Path Forward

The Port proposes to evaluate with USEPA how to create a Remedial Design/Remedial Action process that will account for benthic risk at T4 based on current conditions and reliance on multiple lines of evidence. For example, the risk to benthic organisms at T4 has been substantially curtailed as a result of the 2008 T4 Early Action and upland source control actions. Nevertheless, the Port recognizes that there may be residual risks to benthic organisms at T4. As such, the Port proposes to develop a process to collect data on benthic risk toxicity that will resolve conflicts between studies, and to avoid under- and/or over-estimating areas of benthic risk and generally improve the accuracy and reliability of the benthic risk areas for remedial design.

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Figure

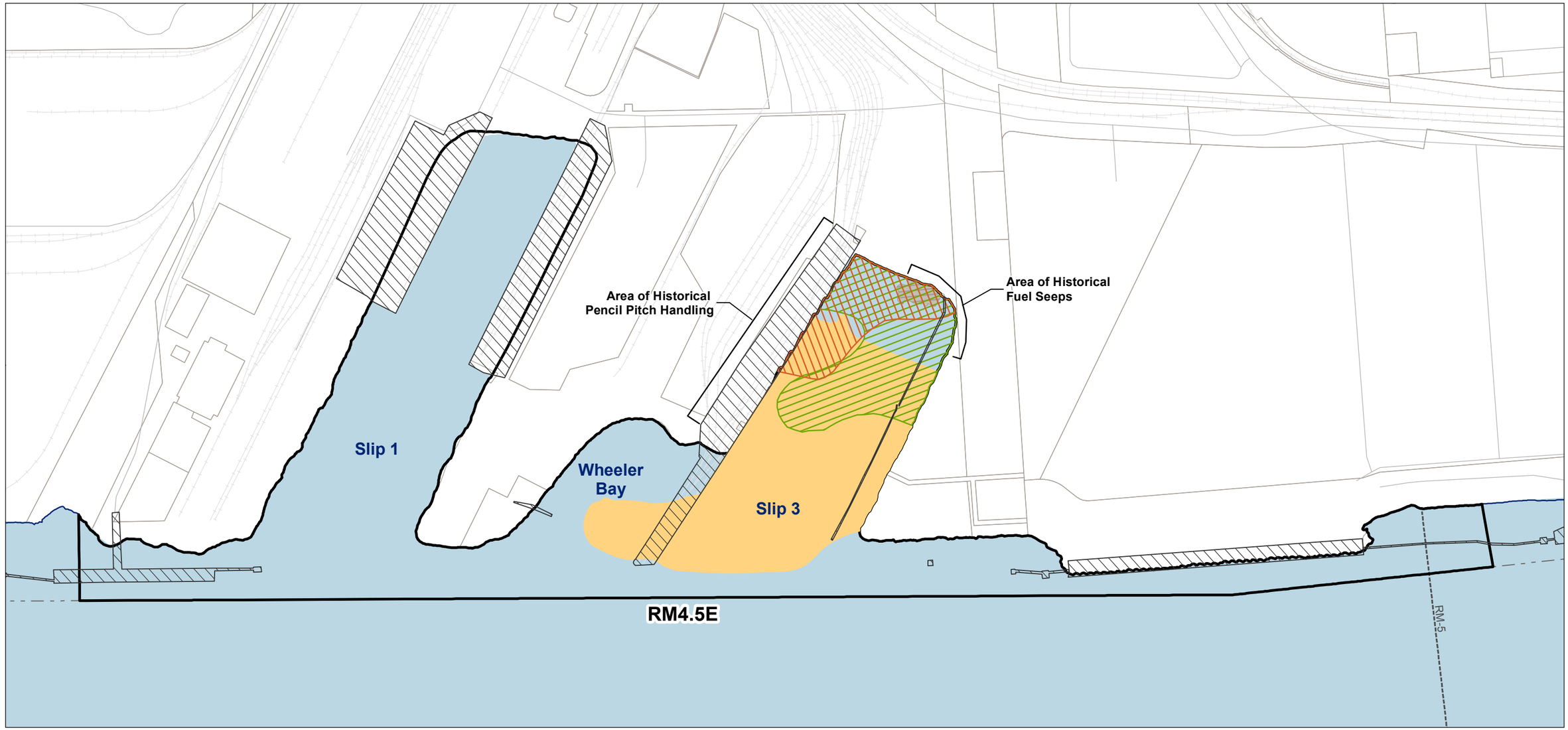

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Figure 1
Delineation of Benthic Risk Areas at Terminal 4
Portland Harbor Superfund Site

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Human Health Direct Contact Risk at Terminal 4

The Record of Decision (ROD) for Portland Harbor applies a Human Health Direct Contact Risk scenario intended to reduce risk to humans from direct contact with contaminated sediment. The Port of Portland (Port) recognizes there may be risk to human health from direct contact with sediments at Terminal 4 (T4); however, the risk exposure pathway at T4 may not be complete across the entire terminal. In addition, an Integrated Risk Information System (IRIS) report recently finalized by the U.S. Environmental Protection Agency (USEPA) would significantly change the preliminary remediation goals (PRGs) and cleanup levels for polycyclic aromatic hydrocarbons (PAHs).

ROD Assumptions

USEPA selected the minimum PRG across all Remedial Action Objectives (RAOs) as the cleanup levels in the ROD for each media. In the Feasibility Study (FS), beach and in-water PRGs were applied to their separate and distinct media, but in the ROD, exposed beaches and in-water sediments were combined into a single "sediment" medium. As a result, the cleanup level in the ROD for carcinogenic polycyclic aromatic hydrocarbons (cPAHs) is based on the most stringent of all direct contact exposure scenarios—the recreational beach user (12 micrograms per kilogram [µg/kg] cPAH). The cPAH RAO 1 PRG presented in the USEPA FS for direct contact with *in-water* sediment is 106 µg/kg. This PRG was also used in the alternatives analysis presented in the ROD (see *Portland Harbor RI/FS Appendix J – Update, Calculation of Residual and Post Construction Risk Estimates*, Table J2.2-2c.).

However, the 12 µg/kg cPAH cleanup level is applied to all "nearshore" sediment (ROD Table 17, footnote 7), including sediment between the shoreline and the federal navigation channel, extending into water depths of -40 feet Columbia River Datum (CRD) or greater. The ROD (page 87) states, "…the potential for direct human exposure to the contaminants in the navigation channel is limited due to the depth of the water." Therefore, the cPAH cleanup level in the navigation channel (3,950 µg/kg cPAH) is not based on direct contact, but rather it is based on human consumption of clams.

Remedial action levels (RALs) are contaminant-specific sediment concentrations used to identify areas for active cleanup, such as dredging or capping. The ROD presents two separate RALs for PAHs to achieve long-term cleanup goals:

1. Outside the navigation channel (i.e., nearshore sediments), the ROD applies the Alternative F RAL of 13,000 µg/kg total PAHs.
2. Inside the navigation channel, the ROD applies the Alternative B RAL of 170,000 µg/kg total PAHs.

The ROD states (page 104), "The modifications to the RALs for the navigation channel are appropriate because the risk exposures and physical conditions in the channel are different from the rest of the Site. Exposure to contaminants in the channel is limited since the depth of the channel is greater than 30 ft…"

On January 19, 2017, USEPA announced the release of the IRIS *Toxicological Review of Benzo[a]pyrene* (USEPA 2017). The updated benzo(a)pyrene (BaP) toxicity values provided in the final IRIS report would significantly change the PRGs and cleanup levels established for PAHs in the ROD.

Site-specific Considerations

In the ROD, a large portion of the remediation area at T4 is attributed to human health risk via direct contact with site sediments contaminated with cPAHs. However, the characterization of human health risk at T4 appears to be inconsistent with current conditions for several reasons:

1. Prevailing water depths in T4 are deep, generally between -30 to -40 feet CRD and are therefore more analogous to conditions in the federal navigation channel.
2. In the approved Baseline Human Health Risk Assessment (LWG 2013), beach use was not determined to be an applicable exposure scenario at T4.
3. The direct contact risk exposure pathway at T4 appears to be incomplete because the Port operates an active, secure marine terminal facility, which is subject to regulation under the Marine Transportation Security Act and the Port's Facility Security Plan (33 Code of Federal Regulations [CFR] Part 105) (collectively, "MTSA"). Under the MTSA requirements, the Port's marine security officers maintain 24/7 patrol of T4 and direct unauthorized vessels to depart when they impact Port operations, including vessel berthing operations. Port security officers may seek assistance from the U.S. Coast Guard or local law enforcement, as needed, to enforce the Port's security protocols.
4. Direct contact exposures are further limited by active marine terminal operations, including frequent vessel calls. T4 Berths 410 and 411 are the most active berths at the Port's marine terminals, with an 80% vessel occupancy rate (approximately 290 days per year), which physically obstructs public access to these areas. (Port of Portland 2016)

Proposed Path Forward

The Port proposes to evaluate with USEPA how to create a Remedial Design/Remedial Action process that will account for the site-specific conditions at T4 that include prevailing navigation use, water depths, restricted site access pursuant to the MTSA, and changes to the PAH PRG.

References

LWG (Lower Willamette Group), 2013. *Appendix F: Baseline Human Health Risk Assessment, Final Remedial Investigation Report*. Portland Harbor RI/FS. Final. March 28, 2013.

Port of Portland, 2016. Memorandum to USEPA, Region 10 from Jeff Krug, Director, Port of Portland Marine Operations. *Operations and Security at Port of Portland's Terminal 4*. September 6, 2016.

USEPA (U.S. Environmental Protection Agency), 2017. *Toxicological Review of Benzo(a)pyrene (CASRN 50-32-8): Executive Summary. Integrated Risk Information System (IRIS)*. Office of Research and Development. USEPA/635/R-17/003Fc. January 2017. Available from: https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=136